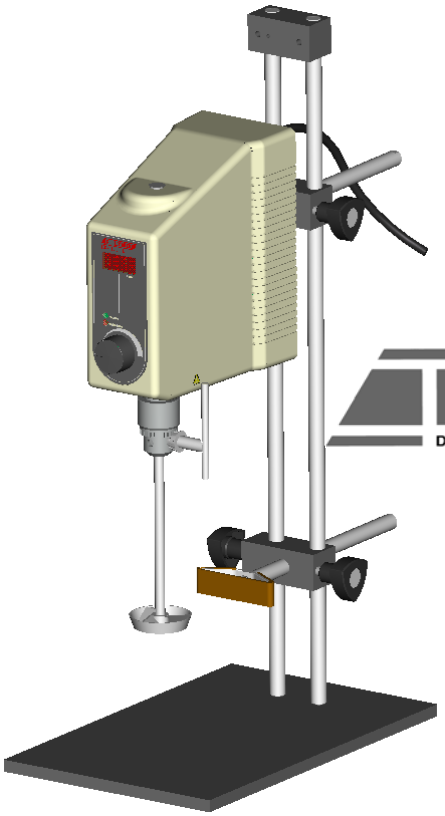
Operating Instructions for POLYMIX® PX-SR 90 D



POLYMIX®
DISPERSING AND MIXING TECHNOLOGY BY KINEMATICA

Voltage
115 – 230 V , 50 – 60 Hz

Ensure that the supply voltage is correct and in agreement with the data on the rating plate.

This is a quality product of

KINEMATICA AG
Dispergier- und Mischtechnik

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1 INTRODUCTION

This chapter gives information on the the structure of this document. It will assist you in making use of it and show how to find the required information quickly.

1.1 OPERATING INSTRUCTIONS

Please read through these operating instructions before switching on or attempting to use the equipment. They describe the use of the POLYMIX® PX-SR 90 D, its installation and maintenance and the appropriate replacement parts and accessories.
They will help you avoid erroneous use and consequent damage. Although POLYMIX® machines are designed for ease of service, this does not release you from the obligation to inspect your equipment carefully and to clean it thoroughly.

KINEMATICA AG is a specialist manufacturer of machines and equipment for dispersion and mixing technology.

An important objective of these operating instructions is to fully inform you, the user, about the correct and safe use of our equipment.

In order to achieve this, it is essential that you should carefully study chapter 2, “Safety”, and follow the instructions in this book.

1.1.1 RANGE OF VALIDITY

The information in these operating instructions relates to the POLYMIX® identified as follows:

Manufacturer: **KINEMATICA AG**, CH-6014 Littau / Lucerne
Brand name: **POLYMIX®**
Product name: **POLYMIX® PX-SR 90 D**

Article No.	Description
35010005	PX-SR 90 D, 230 V (EURO-plug)
35010007	PX-SR 90 D, 230 V (with SWISS-plug)
35010006	PX-SR 90 D, 115 V (with US-plug)

1.2 ORGANISATIONAL MATTERS

If you are unable to find the answer to any question in the operating instructions, please contact the equipment manufacturer directly.

1.2.1 LOCATION OF THE OPERATING INSTRUCTIONS

The operating instructions can only be of use to you if you always have them to hand. They should, therefore, always be kept at the place where the equipment is used.

1.2.2 MANUFACTURER AND CONTACT ADDRESS

KINEMATICA AG
Luzernerstrasse 147a
CH-6014 Littau / Lucerne
TEL: +41 41 259 65 65
FAX: +41 41 259 65 75
e-mail: laboratory@kinematica.ch

1.3 WARNING NOTICES

Please be aware of the meaning of the following warning signs:

Safety instructions must be observed to ensure safe operation

This symbol indicates high voltage, with risk to health and environment

2 SAFETY

This chapter is directed at all users of KINEMATICA laboratory equipment. It includes information on safe and optimum use.

2.1 SUMMARY

Any incorrect use of the installed equipment can be dangerous. Inadequately trained users can cause material damage and personal injury. This chapter informs you of the safety concept and the requirements for safe and optimum use of the equipment.

All those authorised to operate, service and repair the equipment are required to study chapter 2, “Safety”.

2.2 SAFETY CONCEPT

The safety concept sets down the entitlement to use the equipment and the resposibilities of the individual users.

The machines and equipment are designed and constructed according to the state of the art and the recognised safety rules.

2.2.1 INTENDED USE OF THE EQUIPMENT

The equipment is designed and constructed for the following use:

- Dispersion and homogenisation of pumpable fluid products in accordance with the technical specifications (see point 3.5) and compatibility with the materials coming into contact with the products.

If you use the equipment for any purpose other than those listed, the manufacturer cannot be held liable for any resulting damage.

2.2.2 IMPROPER USE

Any use other than the “proper use” without the written approval of the manufacturer or operation outside the technical limits of use is improper use.

2.2.3 USER ROLES

To guarantee safety, we place requirements on the users of the equipment that must be met without fail. Only persons meeting the requirements are authorised to work with the equipment.

We describe all those who work with the equipment as users. Since the requirements of these users are very much dependent on their activity, we distinguish the following user roles.

Contract partner:
The manufacturer can impose legal obligations on the contract partner when the equipment is purchased. The contract partner is obliged to ensure that the equipment is properly used.

Operating company:
The operating company ensures that the equipment is properly used and authorises persons who are entitled to work with the equipment in any one of the defined user roles. He is under the obligation to instruct the users.

Note:
Contract partner and operating company can be the same person.

Service technician:
The service technician is an employee of the operating company and looks after the equipment in special operating mode(s). He is a specialist with mechanical, electrical and electronic professional training. The service technician undertakes commissioning, decommissioning service and repair of the equipment. He must be appropriately trained to be able to carry out the service work required.

Operator:
The operator turns the equipment on and off. In the event of an alarm signal he informs the service technician.

2.2.4 DANGER AREA

System/equipment
The system danger area includes the whole system/equipment including the connecting lead and controls.

Proximity danger area
This refers to all areas within a defined distance of the equipment.

User danger area
This danger area includes all persons working with the equipment.

2.2.5 AREAS OF RESPONSIBILITY

In order that the system/equipment can be used safely and without risk, the users in various roles bear the responsibility for particular danger areas.

Contract partner:
The contract partner bears the responsibility for the “proximity danger area”.

Operating company:
The operating company bears the responsibility for the “user danger area”. Only those users may be authorised to operate the system/equipment who fulfil all requirements of the user roles concerned. In so doing, attention must be paid to the following points:

- It is to be ensured that all users of the system/equipment have fully read and understood chapter 2, “Safety” and act accordingly in a safety-conscious manner.
- It is to be ensured that no unauthorised person carries out work with the system/equipment.
- It is to be ensured that users are informed of the possible risks and dangers connected with the system/equipment.
- It is to be ensured that those being trained or engaged in general training are under the permanent supervision of a trained and authorised person.

Service technician:
The service technician bears the responsibility for the “system/equipment danger area”. He ensures that the system/equipment is at all times free from technical faults, safe and functions correctly.

2.2.6 GENERAL SAFETY RULES

Observe the following general safety rules:
- follow these operating instructions,
- in addition, observe the legal obligations and requirements for accident prevention and environmental protection of the country in which you operate the equipment,
- do not make any modifications to the equipment without the written authorisation of the manufacturer,
- only original replacement parts may be used for repairs,
- before any service work on the equipment, it must be ensured that the electrical supply is switched off,
- after any service, maintenance or repair work has been carried out on the system/equipment, it must be given a test run by the service technician.
- depending on the place at which it is installed, circumstances may require that hearing protection is worn when remaining in the vicinity of the equipment for long periods.

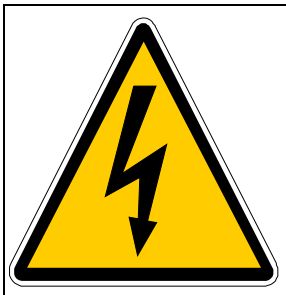
2.3 RESIDUAL DANGERS

When the system/equipment is used in accordance with rules and regulations, residual dangers are minimal.

Residual danger	Countermeasures
Tripping over feed or return lines	These should be appropriately laid
Breakage of glass containers	Wear protective clothing (goggles etc.)
Tipping of the equipment	Stand it on a slip-proof, stable horizontal surface
Spitting of the product	Wear protective clothing (goggles etc.)
Stirring tool can be pulled through the housing, so that the stirring shaft rotates free on top of the housing	Operator has to inform every user about free and rotating stirring shaft.

IN EVERY CASE THE ELECTRICAL INSTALLATION HAS TO BE DONE BY TECHNICIAN!

2.4 WARNINGS



- Ensure that the rated voltage of the equipment matches the supply.
- The equipment may only be opened by KINEMATICA AG authorised service specialists.
- The equipment may not be operated in areas where a danger of explosion is immanent (highly inflammable gases, fluids, dusts)
- Never mix highly inflammable fluids. Never mix substances, as being mixed up, get explosive oh highly inflammable
- Before changing a stirring tool, pleas plug out the connector plug

- Ensure that enough free space is available at the backside of the PX-SR 90 D, so that effective air flow and cooling is assured. Insufficient cooling may lead to a decrease of power output (see picture in Chapter 4.2).
- The PX-SR 90 D has to be placed that no dirt or fluid could penetrate through the air grilles
- Before beginning a mixing job ensure that the stirring tool is well tightened. An insufficient tightened stirring tool could get unlocked. Risk of injury
- The stirring tool has to be immersed while operating
- Ensure that every stirring tool is dynamically balanced. Insufficient balanced stirring tools may lead to undesirably resonances which may cause damages to glass vessels. Whenever unbalances may occur the rotating speed has to be decreased to value where no more unbalances are remarkable.
- Do not use oversized stirring tools. The longer they are, the stronger undesirably resonances will be.
- Avoid stirring tools and chucks getting stroked. Already invisible damages may lead to dynamic unbalances. Careful working assures longer life to the equipment.
- Ensure that stirring tools get cleaned after every stirring job.
- In the event that hazardous chemicals or materials that endanger health can influence the surroundings or use of the equipment, appropriate countermeasures must be taken.
- When the power cable is plugged in, never manipulate the mounted chuck or the stirring tool. Increased risk of injury.

	• In the event of any power cut, the equipment must be switched off; otherwise, it may start again without proper supervision. • Risk of injury caused by the geometry of the stirring tool which may be razor-sharp. • Before starting a stirring job, ensure that the mounting-key for the chuck is removed
CE-marking	• KINEMATICA AG products comply with all the usual CE direc carry the CE marking and are delivered with a correspo declaration of conformity.

3 Description of laboratory equipment

POLYMIX® PX-SR 90 D stirring-system conforms to all current and relevant CE regulations, carries the CE sign and is supplied with the relevant certificate of conformity.

3.1 OVERVIEW

The POLYMIX® PX-SR 90 D stirrs and mixes various liquid products and is suitable for applications for working volumes up to 20 liters (depending on the viscosity of the product being mixed and the stirring tool. The system is designed for unpressurised operating with working temperatures up to 90 °C.

The drive unit can be equipped with a wide range of POLYMIX® stirring tools (drive-shaft diameter up to 10 mm). Stirring tools are mounted in the chuck and are therefore easily to change. Furthermore the drive unit is equipped with a switch on the backside to change the rotating direction (see pictures in Chapter 4.2)

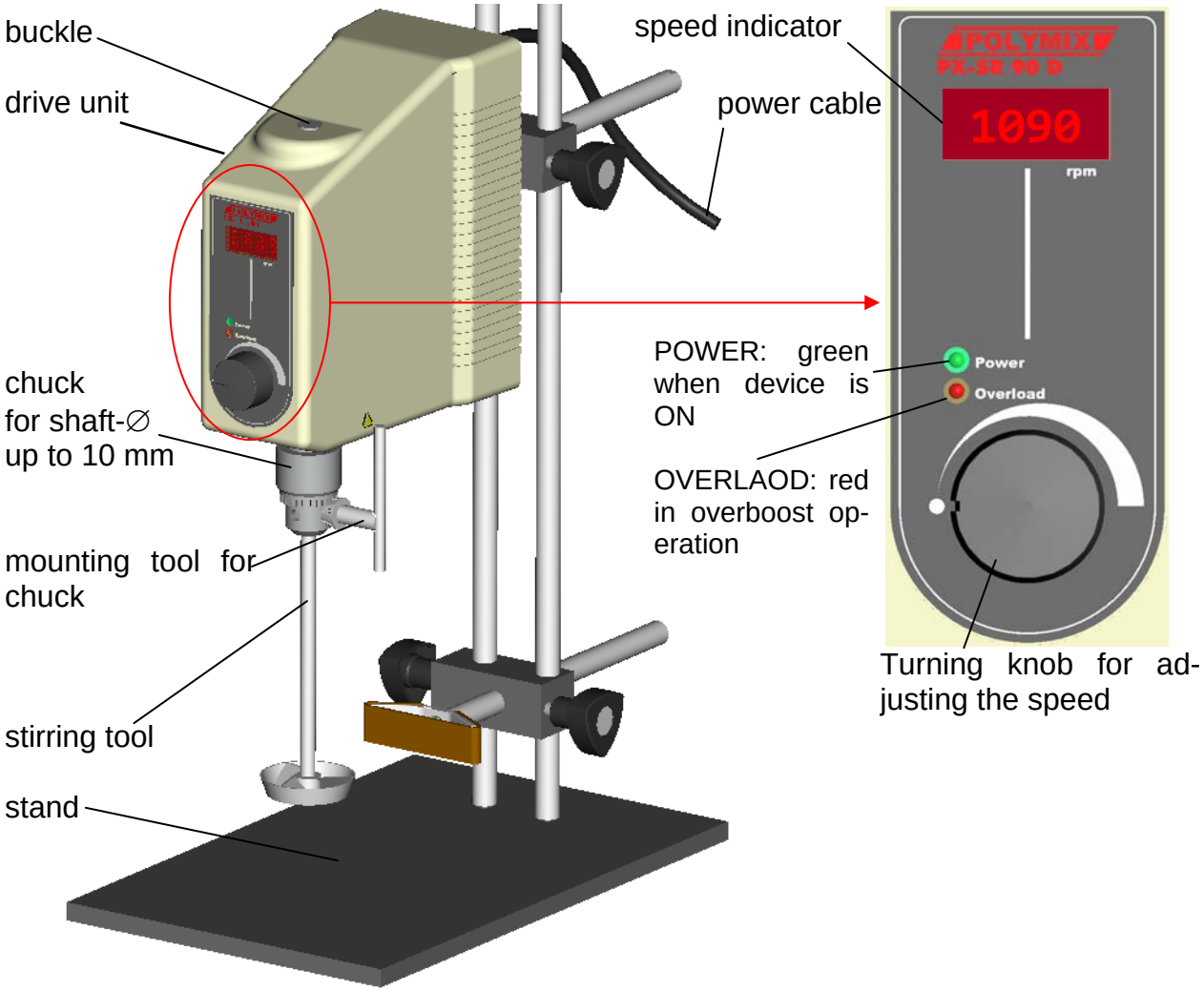
Caution: The switch to select the rotating direction should only be used when the drive unit is OFF. Switching while the drive is working may cause malfunction of the system.

For a workable system you require:

- **Drive unit PX-SR 90 D**
- **Stand (KINEMATICA recommends the SAFETY STAND ST-P20/800)**
- **Stirring tool**
- **Tool for chuck**
- **Power cable**
- **Outlet 115- 230 V at 50 - 60 Hz**

3.2 DRIVE UNIT

The drive unit consists of a powerful speed-regulated direct current motor. The power transmission to the stirring tool is realized by a belt drive. The rotating speed can be adjusted using the turning knob on the frontside. The speed is visualized on 4-digits display. The maximum speed is 2000 rpm. When the drag of the product gets to high or the unit is suddenly blocked, the units overload protection system sill shut off the unit after short time when working in the overload range. The OVERLOAD indication will be activated. The POLYMIX® PX-SR 90 D system can easily be set up in a few steps.



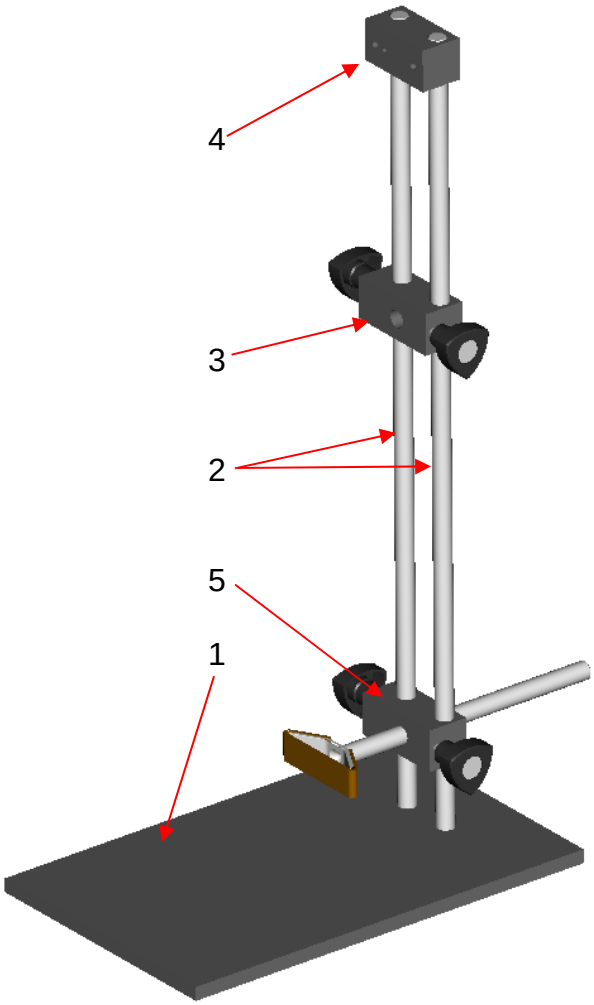
Note

- Under certain electrical environmental conditions (i.e. strong electromagnetic fields), fluctuations of the speed indicator of up to +/- 10% may occur.
- When rotating speeds are below 250 rpm, the running accuracy may be decreased. Thereby the real speed can vary to displayed speed of up +/- 10% (based on max. speed 2000 rpm)

3.3 STAND

The drive unit PX-SR 90 D is designed for operation mounted on a stand. KINEMATICA AG recommends the universal double-rod-safety-stand ST-P20/800. Depending on the size of the working vessel, a vessel holder may be useful.

➔(a dimensional-drawing with Id. No. is attached in the appendix)



1	plate
2	pillar
3	boss head for drive unit
4	safety ring
5	vessel holder incl. boss head

3.4 POLYMIX® STIRRING TOOLS

Different types of stirring tools are available for the PX-SR 90 D.

A table of suitable stirring tools can be seen as follows:

- Propeller stirrer
- Turbine stirrer
- Anchor stirrer
- Flat stirrer
- Centrifugal stirrer
- Kneading stirrer
- Dissolver
- Potter

For a detailed description of the stirring tools is see Chapter 7 „ACCESSORIES“. The stirring tools can be ordered directly from KINEMATICA or your preferred distributor.

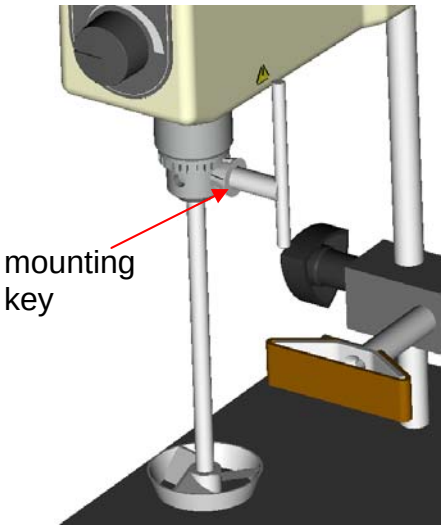
Mounting:

Using the mounting key, stirring tools can quickly be changed.

Procedure: Insert the stirring tool from below of the chuck, than tighten the chuck well, using the mounting key (clockwise)

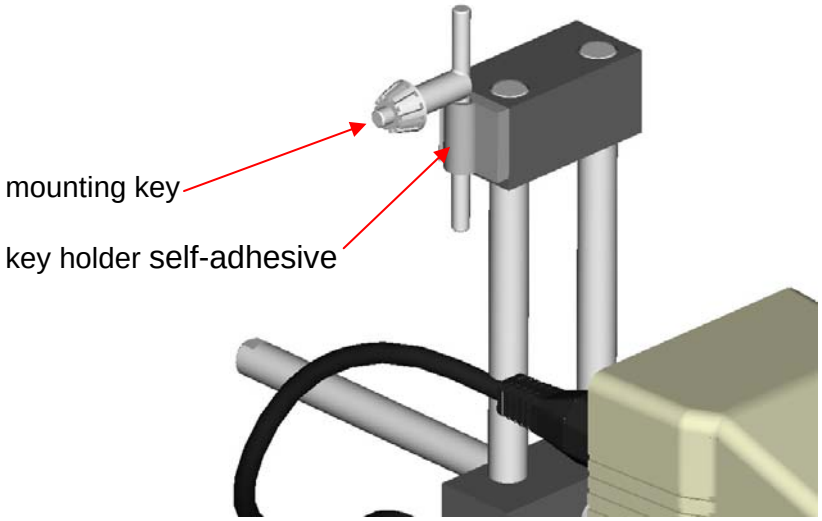
To unlock a stirring tool, just proceed in reverse order.

While stirring tools are mounted or removed, the power cable has to be removed from the power outlet.



Caution: On continuous duty the chuck may heaten up – Risk of burning! Let the chuck cool down.

Avoiding the mounting key to get lost, the provided, self-adhesive key holder should be used. Stick it on clean dry surface (i.e. at the topend of the stand, see picture below).



3.5 TECHNICAL DATA & SPECIFICATIONS

Drive unit PX-SR 90 D	
Typ of motor	direct current
Voltage	115 V ~ bis 230 V ~
Frequency	50 - 60 Hz
Maximum speed	2000 min^{-1}
Maximum input power	140 W
Maximum output power	60 W
Selection of rotating direction	yes
Softstart	yes
Noise level	65 dB(A) bei 2000 min^{-1}
Ambient temperature	0 – 40°C
Relative humidity	Max. rel. 95%
Standards	EN 61010, EN 61000-6-2, EN 61000-6-3 UL-94-V0
Protection class	IP 20
Max. period of continuous operation	Up to the viscosity of the product continuous duty is possible
Dimensions	See appendix
Weight	ca. 3 kg (excl. stirring tool)

Stand ST-P20/60 bzw. 80	
Dimensions HxWxD in mm	600/800x200x315
Weight	Ca. 3.8 kg

4 INSTALLATION

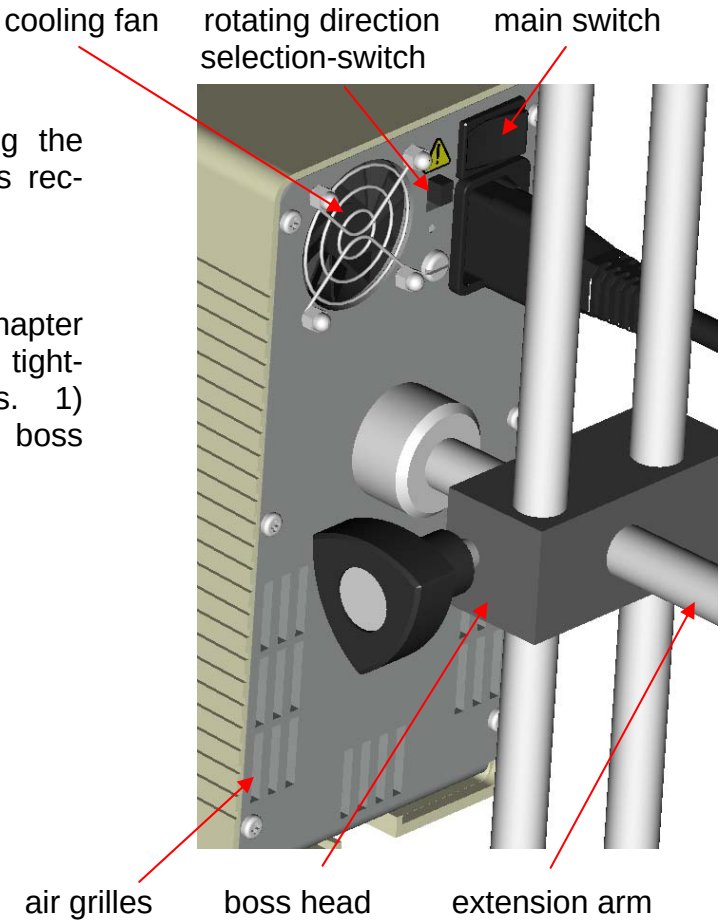
4.1 UNPACK

Open the dispatch box and check that the contents agrees with the delivery note.

Check all parts for possible transport damage.
Inform us or your dealer immediately of any disagreement or fault.

4.2 ASSEMBLY

- Screw in the extension arm using the provided tool. The use of loctite is recommended.
- Stand:
  Assembly as seen on picture in Chapter 3.3. The pillars (Pos. 2) have to be tightened well on the plate (Pos. 1) Than insert the drive unit into the boss head using the extension arm.
- Mount any desired stirring tool (see Chapter 3.4)



4.3 COMMISSIONING

Connect the drive unit to the electrical supply. **Check the supply voltage against the rating plate**.

- Immerse the assembled stirring system in the product by adjusting the position of the boss head
- Never immerse the stirring tool that deep that the chuck could get in contact with the product.
- Turn ON the drive unit using the mains witch on the backside
- (see picture in Chapter 4.2)
- Adjust speed using the turning knob

	• Ensure that the stirring tool will be cleaned after every stirring job. • Ensure that the stirring tool does not interfere with the mixing vessel during a stirring job. • Never touch the stirring tool or the chuck when drive unit is on duty.

4.4 BEHAVIOUR AT OVERLAOD, BLOCKADE, & OVERHEATING

The drive unit is protected against overheating and blocking

On overboost operation the internal speed controller tries to hold a possible maximum speed, which varies from the displayed speed. Overload is indicated by the red LED. If the load gets to high the drive will be shut off. In that case the speed controller stops the motor totally. The drive unit has to be restarted using the main switch on the backside of the stirrer. In order to restart, just turn it OFF and ON.

If the drive unit will be operated with low rotating speeds in high-viscosity products, the motor could reach a critical temperature. To protect the motor from overheating the speed controller will turn off the motor automatically. To continue operating afterwards, the drive unit has to be cooled down.

To generate effective cooling, it is suitable to proceed as follows:

- Turn the turning knob to zero.
- Reset the system by turning it off and on using the main switch
- Let the drive unit cool down for approx. 5 Minutes. (Internal cooling fan will be active.)

5 SERVICE

Your POLYMIX® drive unit is designed for easy service. Nevertheless, it is essential to inspect your equipment carefully and to clean it thoroughly. Drawings of the separate components are to be found in the appendix.

The equipment must be disconnected from the electrical supply:

- When changing or removing the stirring tools
- During any work on the equipment, in order to avoid any personal injury or other damage.

The housing is made of styrene butadiene and meets best fire protection requirements UL-94-V0. Only suitable cleaners should be used.

Under normal working conditions, the POLYMIX® PX-SR 90 D requires no servicing. Parts such as the motor armature and bearings are subject to natural wear.

We strongly recommend that service work and repairs should be carried out only by authorised KINEMATICA service centres or by KINEMATICA directly, where original replacement parts are available.

Any unauthorised modification or manipulation of the unit or its equipment leads to immediate annulment of the guarantee.

6 TROUBLE SHOOTING

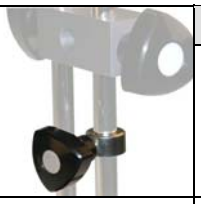
PROBLEM	REASON	CORRECTIVE MEASURES
Unusual noises	Damaged drive bearings	Change ball bearings
Runs hot and does self-protective turn-off	Insufficient cooling	Check air grilles are clear
	Defective cooling fan	Replace cooling fan by a new one
Vibrations	Bent stirring shaft	Replace stirring shaft by a new one
	Worn bearings	Replace bearings
	Defective chuck	Replace chuck
Stirring tool does not rotate and the red LED „OVER-LAOD“ is active	Drive unit is overloaded	Check for blockade and re-start the drive unit
	Defective motor or cabling	Send the equipment to the nearest authorised KINE-MATICA AG service centre or directly to KINEMATICA AG
Stirring tool does not rotate but no „OVERLAOD“ is indicated	Defective belt drive	Send the equipment to the nearest authorised KINE-MATICA AG service centre or directly to KINEMATICA AG

7 ACCESSORIES

Safety stand with accessories

	Safety stand	Order-No.	height [mm]	width [mm]	depth [mm]
	ST-P20/800	35040005	800	200	315
Description	Double rod stand for high safety and avoiding any tilting. Designed according to the latest safety guidelines. With boss head for the drive unit.				

	Vessel holder	Order No.	length [mm]	width [mm]
		35040050	219	68
Description	Vessel holder for fixing any mixing7processing tank. Suitable for the safety-stand incl. boss head.			

	Safety ring	Order No.
		35040051
Description	The safety ring avoids any uncontrolled downward movements of the drive unit. Can also be used to fix the working height of the unit.	

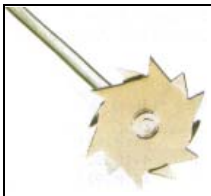
Stirring tools

For optaining optimal mixing results, it is recommended to use stirring tools according to the description in the following tables. If nothing else is mentioned, every stirring tool is made of stainless steel.

	Propeller stirrer 4 blades	Order No.	Stirrer- Ø [mm]	Shaft- Ø [mm]	Shaft length [mm]	max. speed [Rpm]
		35030010 35030011	50 100	8 8	350 550	2000 800
Description	Standard stirrer. Top down suction of the fluid. Local shear forces. Generates axial flow in the vessel					
Application	Mixing particulate material, stirring of thickening agents, suitable for medium to high speeds					

	Propeller stirrer 3 blades	Order No.	Stirrer- Ø [mm]	Shaft- Ø [mm]	Shaft length [mm]	max. speed [Rpm]
	PTFE jacketed	35030020 35030021 35030022	45 55 75	8 8 8	350 350 350	2000 2000 800
Description	Favourable to flow. Top down and bottom up suction of the fluids. Low shear forces					
Application	Mixing particulate material, stirring of thickening agents, suitable for medium to high speeds, PTFE version for aggressive products (i.e. acids)					

	Turbine stirrer	Order No.	Stirrer- Ø [mm]	Shaft- Ø [mm]	Shaft length [mm]	max. speed [Rpm]
		35030030	30	8	350	2000
Description	Top down suction of the fluid. Generates axial flow in the vessel. Low shear forces.					
Application	Mixing lightweight particulate material, stirring of paint, suitable for medium to high speeds					

	**Dissolver**	Order No.	Stirrer- Ø [mm]	Shaft- Ø [mm]	Shaft length [mm]	max. speed [Rpm]
		35030040	80	8	350	2000
Description	Radial flow. Top down and bottom up suction of the fluid. High turbulences, high shear forces					
Application	Particle crushing at high speeds.					

	Centrifugal stirrer	Order No.	Stirrer- Ø [mm]	Shaft- Ø [mm]	Shaft length [mm]	max. speed [Rpm]
		35030050	60/15	8	350	2000
Description	Two blades stirrer. Opens up at increasing speed.					
Application	For small-neck-bottles, suitable for medium to high speeds.					

	Flat stirrer	Order No.	Stirrer- Ø [mm]	Shaft- Ø [mm]	Shaft length [mm]	max. speed [Rpm]
		35030060	70	8	350	1000
Description	Tangential flow. Low turbulences. Good heat transfer.					
Application	Sparing treatment of the product, suitable for low to medium speeds					

	Anchor stirrer	Order No.	Stirrer- Ø [mm]	Shaft- Ø [mm]	Shaft length [mm]	max. speed [Rpm]
		35030070	45	8	350	1000
Description	Tangential flow, high shear rates in the border area. Few disposal at the vessel wall					
Application	Suitable for mixing up fluids with middle to high viscosity at low speeds.					

	Kneading stirrer	Order No.	Stirrer- Ø [mm]	Shaft- Ø [mm]	Shaft length [mm]	max. speed [Rpm]
		35030080	45	8	350	2000
Description	Tangential flow. Oscilating compression between the kneeding planes. Few disposal at the vessel wall.					
Application	Sparing treatment of the product (eatables)					

	Potter	Order No.	Stirrer - Ø [mm]	Wellen - Ø [mm]	Shaft length [mm]	max. speed [Rpm]
	2 ml with vessel	35030090	8	6.5	230	1000
	5 ml with vessel	35030091	12	6.5	230	1000
	15 ml with vessel	35030092	19	6.5	280	1000
	2 ml with vessel&cooling	35030100	8	6.5	230	1000
	5 ml with vessel&cooling	35030101	12	6.5	230	1000
	15 ml with vessel&cooling	35030102	19	6.5	230	1000
Description	Consisting of a mortar (borosilicat glass) and a pestle (PTFE)					
Application	For homogenizing smallest amounts of tissue, pulping of cells and bacteria. No additional fluid necessary.					

For further information, please ask your dealer or contact KINEMATICA AG directly.

8 WARRANTY

KINEMATICA AG guarantees that the equipment that it produces will run free of any fault related to materials or manufacturing faults for **12 months**.

If thorough testing shows a fault to be due to either of the above causes, KINEMATICA AG guarantees that the equipment will be repaired or replaced free of charge.

The guarantee does not cover parts that are subject to normal wear and tear. It is void if any person other than an employee of KINEMATICA AG or their appointed representative has made modifications to the equipment or if the damage is due to failure to comply with the operating instructions, to carelessness, accident, incorrect use or incorrect supply voltage.

KINEMATICA AG reserves the right to make technical changes to the equipment without modifying equipment delivered earlier in the same way.

In the event of technical problems, for spare parts requirements or for advice, contact our regional appointed agent, your preferred dealer or us directly at:

KINEMATICA AG

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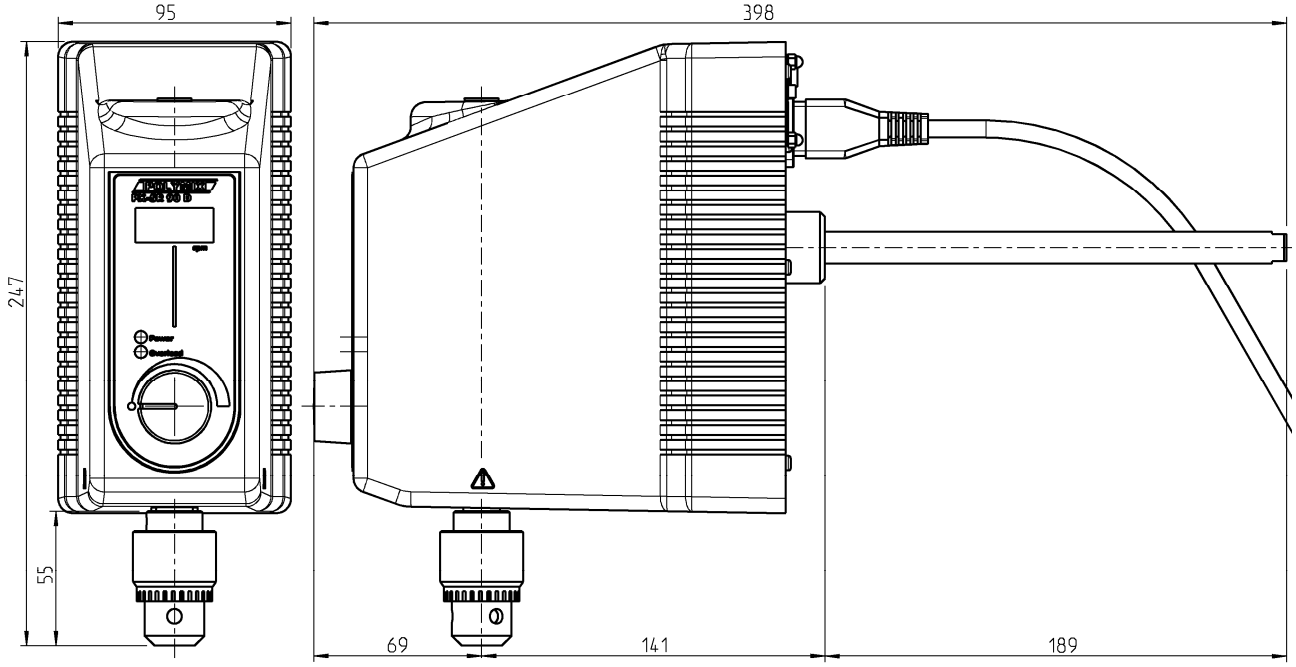
eMail laboratory@kinematica.ch

Appendix 1: List of spare parts

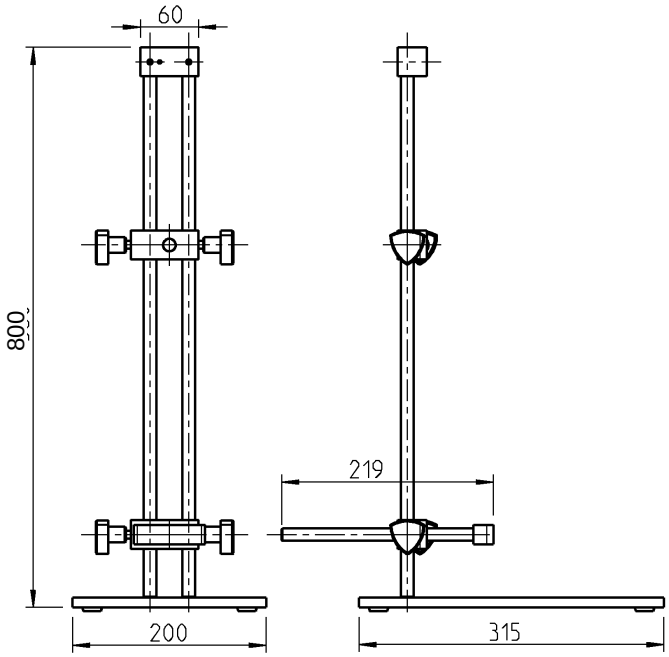
Componente	Id.-No.
Extension arm	9750903
Housing for PX-SR 90 D with frontal decal	9753012 9340124
Chuck 1-10 mm	9752821
Turning knob	9800302
Buckle	9340112
Belt-drive	9340118

Appendix 2: Dimensional drawings and Id.-No.

Drive unit POLYMIX®PX-SR 90 D



Stand ST-P20/800



Assemby Group	Main Identification	Order No.	Production-No.	Product-Identification
Drive unit	PX-SR 90 D / 230 V with CH/EU-plug	35010005	9609505	PX-SR 90 D
			9835418	Cable (CH/EU-plug)
	PX-SR 90 D / 115 V with US-plug	35010006	9609505	PX-SR 90 D
			9835416	Cable (US-plug)
Stand	ST-P20/800	35040005	9753143	Plate
			9753201	2 x pillars 782 mm
			9750875	2 x boss head
			9135040	Vessel holder ST 34